

CLEMSON Impacts

SUMMER 2008



Clemson University Public Service Activities



Biotech Industry at Pee Dee Center
Shrimp Industry Outreach
Water Resources Conference
African Sleeping Sickness Research
Adventure Camp Challenges Teens



Letter from the Vice President

As the price of oil continues to rise, Clemson scientists are exploring alternative fuels that can be produced in South Carolina. Alternative sources being studied include agricultural waste and trees grown especially for fuel. Other scientists are investigating ways to improve early strawberry production and are sharing management systems to boost profitability for cattlemen.

Social science research is being put into practice to build strong communities that provide a safe and supportive environment for children. This model program brings together community members from all sectors – schools, civic groups, churches, health care and business – with the goal of protecting and nurturing our most precious resource: children.

Environmental research is discovering that oysters can produce high-tech coatings that protect metals from corrosion and reduce resistance. Other research is restoring “brownfields” – areas that have been polluted by chemicals. In addition to the science, a team approach and long-term vision are needed to restore or prevent damage to the environment.

Food scientists are finding that poultry processors can reduce water usage by using chilled air instead of water to prevent food-borne bacteria. Other research is investigating ways to reduce the fat content in beef cattle as a means to reduce fat in human diets.

A remarkable partnership with the S.C. Department of Education, private donors and Clemson has set a goal of developing a national-model for nature-based education programs for both teachers and students. The first programs will be implemented this summer with more to be offered in the future.

Sincerely,

John W. Kelly

Vice President for Public Service and Agriculture

Knowledge for living. Knowledge for life.

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PUBLIC SERVICE

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Photo by Tom Lollis

Pee Dee Center gears up to build state biotech industry

By Peter Kent

Biotechnology plays a critical role for increased agricultural productivity and opens up the possibility of improved crops for food, medicine, bio-energy and industrial materials. Business analysts estimate that the global market potential of agricultural biotechnology over the next ten years is \$320 to \$400 billion.

Laboratories and support facilities at the Pee Dee Research and Education Center in Florence are being retooled to support advanced plant materials research into new products and industrial processes.

The research facilities will accommodate scientists from both Clemson and industry to position the Florence area as a biotechnology center, attracting investment and employment to the region.

For more information: George Askew, 864-656-2661, gaskew@clemson.edu.

Food crops show promise to prevent chronic diseases

By Peter Kent

Imagine eating your way to better health. Scientists at Clemson, the Medical University of South Carolina (MUSC) and the U.S. Department of Agriculture (USDA) are working to make that a reality.

"Our goal is to produce foods that help prevent the onset of chronic diseases such as diabetes and colon cancer," said David Gangemi, director of Clemson's Institute for Nutraceutical Research.

Chronic inflammation has been linked to many diseases, including cancer, diabetes, heart disease, asthma, and Alzheimer's. The scientists are collaborating to identify and enhance the antioxidant and anti-inflammatory properties of food crops grown in South Carolina.

Nutrition scientists are studying the active bio-compounds in collards, kale, cilantro, coriander, muscadine and other crops. Clemson and USDA plant scientists at the Coastal Research and Education Center in Charleston are seeking to enhance the beneficial compounds and to process the crops into usable products. MUSC scientists are conducting clinical trials to test effectiveness.

In addition to improving health, their research may provide new cash crops for the state's farmers.

For more information: David Gangemi, 864-656-3015, gangemj@clemson.edu.



Photo by Tom Lollis



Photo by Peter Kent

Ag-engineer seeks to improve profitability for poultry industry

By Peter Kent

Layers, broilers and turkeys are a big business in South Carolina. The poultry industry provides about \$1.5 billion a year to the state's economy.

Clemson agricultural engineer John Chastain consults with poultry producers to help lower their energy costs and improve operations.

"I look for ways to save them money," said Chastain. "I typically evaluate the operation for ventilation, insulation and lighting. Those factors have a big impact on animal growth and health as well as operating costs, especially fuel expenses." Savings can be 40 percent or more on heating, cooling and lighting costs.

He also has studied using chicken and turkey house litter to fertilize pine trees that produce pine needles for landscaping. The outcome was a win-win, with poultry growers finding a way to dispose of manure and pine-needle producers finding a low-cost, natural fertilizer.

For more information: John Chastain, 864-656-4089, jchstn@clemson.edu.

Bull testing program gives cattlemen data on superior cattle

By Peter Kent

A recent issue of National Cattlemen magazine estimated that South Carolina has 215,000 beef cattle, down from 280,000 in years past. Clemson beef cattle experts are working with the SC Cattlemen's Association to improve the quality, productivity and profitability of cows and calves in the state.

The Clemson bull testing program at Edisto Research and Education Center in Blackville evaluates the growth rate of bulls consigned primarily by purebred breeders. The program allows producers to compare their breeding and management programs to the rest of the state's purebred industry.

The tests help both consignors and buyers identify bulls with superior growth, conformation and fertility for their breeding programs. Records indicate there has been great improvement of the bulls in all three areas.

For more information: Larry Olson, 843-284-3343, lolson@clemson.edu.



Photo by Tom Lollis

Apple producers expanding crops to include peaches

By Diane Palmer

Commercial apple growers in Oconee have been facing challenges from increasing costs for equipment, chemicals and fertilizer, as well as from foreign competition.

Clemson Extension fruit specialist Desmond Layne recommended adding peaches as an alternative crop. This would utilize existing equipment and increase sales with a wider variety of fruit and a longer selling season.

In 2005, some of the producers sold their first crop of peaches. Now, each grower has a small block of peach trees. In July a field day was held at Clemson's Musser Fruit Research Farm to help growers improve production for both peach and apple crops. This provided an opportunity for growers to talk with Layne and other Clemson scientists about their latest research.

For more information: Howard Hiller, 864-638-5889, hhiller@clemson.edu.



Improved livestock research facility to support cattle industry

By Peter Kent

Research farm facilities at Clemson's Simpson Station are being upgraded to help beef cattlemen produce better quality meat. The improvements will aid scientists seeking to improve livestock genetics, health, nutrition and dinner-plate appeal.

"The cattle business is changing and we need to change with it," said Garland Veasey, director of research farm services. "We want our researchers to have the outdoor laboratory resources they need to support the livestock industry."

The upgrades include better farm security, reworked research pastures, and on-site treatment and testing areas. Livestock research at Clemson has helped producers improve cattle health and nutrition, fertility and reproduction, and fat characteristics of meat.

Now scientists are investigating pasture-finished beef, where cattle grow to market size on grasses instead of feedlot corn. Consumer trends have shown grass-fed beef has market appeal, adding to producers' profitability.

For more information: Garland Veasey, 864-656-3477, gveasey@clemson.edu.



Photo courtesy NOAA

Research and outreach bolster competitiveness of shrimp industry

By Peter Kent

Cut-rate imported shrimp, coupled with meager harvest years, have threatened the southern shrimp industry.

Since 2003, Clemson researchers and Extension specialists have worked with South Carolina shrimpers to develop a marketing plan for wild-caught shrimp; document quality differences between wild-caught and farm-raised shrimp; and help industry leaders evaluate and plan to improve facilities and processes.

The long-term goal is to create a sustainable shrimp industry in the state, the South Atlantic region and the nation. Tactics include creating a comprehensive risk management program, exploring the feasibility of a regional shrimp processing facility, improving the profitability of marketing to local retail outlets, and establishing local zoning ordinances to protect access to docking facilities.

The research and outreach program was funded by a federal grant that also provided economic assistance to the shrimpers, dock owners and shrimp-related businesses.

For more information: Susan Barefoot, 864-656-3141, sbrft@clemson.edu.

Communities can attract tourists with food-related events

By Peter Kent

While tourism generates more than \$10 billion for South Carolina's economy and employs an estimated 216,000 people, its primary impact is along the coast, according to a 2006 study by Tourism Development International.

The consultants stated that there are not enough attractions to support tourism in inland areas. However, they highlighted agriculture as a possible tourism development strategy for the Florence area.

William Norman, a Parks Recreation and Tourism Management researcher, is seeking to fill in the gaps in the consultants' report. He is studying the role that food has throughout the state as a way to increase tourism outside the coastal areas.

"Understanding the importance of food as a component of heritage, culture, the arts and nature can help communities enhance their tourism appeal," said Norman.

For more information: William Norman, 864-656-2060, wnorman@clemson.edu.



Photo by Tom Lollis

Writing program helps students and communities

By Debbie Dalhouse

A writing program that provides free services to non-profit organizations is benefitting both the organizations and students. The Client-Based Writing Program matches business and technical writing students with non-profits in Pickens, Oconee, Anderson and Greenville counties.

Since 2003, more than 2,300 students have produced 700 documents for 47 organizations, providing real-world experience for the students and valuable materials for the clients. Materials include brochures, employee training manuals, grant proposals, marketing plans and Web sites.

"We are honored to receive recognition for this effort, which is truly a collaboration among faculty, students and the community," said Summer Taylor, director of the advanced writing program.

The program was nominated for the award by Kathy Woodard, director of the Service Alliance, which encourages service-learning projects across the university.

For more information: Kathy Woodard, 864-656-0205, ckathy@clemson.edu.



Photo by Craig Mahaffey

Sand River restoration master plan in development

Photos by Peter Kent

Study seeks to reduce damage caused by squirrels

By Debbie Dalhouse

With few predators in urban environments, squirrel numbers increase so that their gnawing and stripping the bark can kill even mature trees. Clemson scientists are participating in a USDA research project to control squirrel populations through contraceptives.

"Most people don't realize the extent of damage gray squirrels can cause," said Greg Yarrow, Clemson wildlife ecologist. "This study will evaluate the effectiveness of two different types of contraceptives in preventing reproduction in gray squirrels."

One contraceptive, GonaCon™, is injected and renders both male and female squirrels infertile with just one treatment. Another, DiazaCon™, is administered through treated feed over a 10-day period and lasts approximately four months. The treated feed is delivered through feeding stations mounted out of reach of other animals.

Research is conducted by doctoral students, Murali Pai and Cady Etheredge, in conjunction with scientists at the USDA National Wildlife Research Center, the state USDA Wildlife Services and the Department of Natural Resources.

For more information: Greg Yarrow, gyarrow@clemson.edu, 864-656-7370.



By Sonya R. Albury-Crandall

Over centuries, sporadic stormwater flows have created a sandy streambed called Sand River that meanders through the 2,000-acre Hitchcock Woods forest in Aiken.

As more development has occurred, paving over open lands, stormwater volume and velocity have increased. This has caused severe erosion, carving a deep canyon in the headwaters and carrying sediment into forested wetlands.

The City of Aiken awarded a grant to Clemson's Center for Watershed Excellence to develop a restoration plan for the river. A team of engineers, ecologists and landscape architects is helping community members build consensus on cost effective, ecologically sensitive solutions.

The community's goal is to address the stormwater impacts; restore the ecological functions of the Sand River; preserve historical and cultural sites, nature trails and flora; and maintain natural ridges and diverse wildlife habitats.

For more information: Gene Eidson, 864-656-2618, or www.clemson.edu/restoration/ecology/.

Plant scientists track down harmful weed

By Peter Kent

Cogongrass looks pretty but it is a mighty pest that is considered one of the 10 most harmful weeds in the world. It infests lawns, pastures, golf courses, roadways, forests and recreational and natural areas, and overwhelms other plants.

In South Carolina, Clemson's Department of Plant Industry, the Cogongrass Task Force and more than 175 volunteers have detected the weed in nine counties. The task force includes the state Exotic Plant Pest Council, the Native Plant Society, Forestry Commission, Department of Natural Resources, Department of Transportation, and the USDA Forest Service and Animal and Plant Health Inspection Service.

Clemson plant industry experts and task force members conduct workshops to advise the public about the weed and how to identify it. Plant industry experts treat known sites with recommended herbicides and check garden centers for Red Baron and Japanese blood grass, which are prohibited plants in South Carolina because they are the same genus and species as cogongrass.

Volunteers can sign up for future surveys, get updates on activities or report sightings of cogongrass at www.clemson.edu/for/cogon.html.

For more information: Steve Compton, 864-646-2130, scompto@clemson.edu.



Photo by Steve Compton



Developing cost-effective watershed management programs

By Peter Kent

The U.S. Environmental Protection Agency (EPA), in conjunction with S.C. Department of Health and Environmental Control, has designated Clemson as the center of excellence for watershed management in South Carolina. This is only the third such center to be designated in the Southeast.

"Clemson's Center for Watershed Excellence will build partnerships with universities, government agencies, communities and other groups to develop cost-effective watershed management programs for communities throughout the state," said Gene Eidson, director of the Restoration Institute's ecology program.

The center has already begun working with the City of Aiken and Hitchcock Woods Foundation to develop an ecological restoration master plan for Sand River. It is also working with Pickens County to formulate a 20-year plan that addresses population growth and water needs, installing remote sensors to monitor water quality in four test sites across the state, and planning a statewide water resources conference in October.

For more information: Gene Eidson, 864-656-2618, geidson@clemson.edu, or www.clemson.edu/restoration/ecology/.

Water resources conference will address state and regional issues

By Sonya R. Albury-Crandall

More than 100 presentations have been submitted for the first S.C. Water Resources Conference October 14-15 in North Charleston. Presentations will address critical water issues affecting the state and the Southeast region, with a focus on research and policies vital to the quality of life and economic prosperity.

The conference seeks to build collaboration among all organizations concerned with water issues: public policy decision makers, municipal water authorities, environmental engineering and consulting firms, colleges and universities, government agencies, non-profit organizations, economic development groups, utility companies, land managers and concerned citizens.

Led by the Center for Watershed Excellence at Clemson, the conference planning committee includes representatives from Coastal Carolina University, College of Charleston, Medical University of S.C., University of S.C., as well as local, state and federal agencies responsible for water quality.

For more information:
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Photos by Dan Hitchcock

Photo by Peter Kent



African sleeping sickness research provides insights into diabetes

By Peter Kent

A single-celled parasite called *Trypanosoma brucei* causes African sleeping sickness and kills both humans and cattle. It causes more deaths than HIV/AIDS in some areas of Africa and is considered an uncontrolled disease by the World Health Organization.

Research by genetics scientist Jim Morris is pointing a way to control the disease. His research is based on the fact that the parasite depends on its host's blood sugar, or glucose, to survive.

Breaking the pathway by which the parasite uses glucose can help rid Africa of a disease that has prevented vast regions from being farmed. His studies also found new uses for already approved medications that can lower the cost of treating the disease.

"As global climate changes occur, it is important that we understand and be prepared to confront diseases that in the past have been confined to tropical areas," Morris said. His research also may help scientists uncover ways to control blood-sugar levels in people with diabetes.

For more information, contact Jim Morris at 864-656-0293, jmorri2@clemson.edu.

Nutrition information added to websites

By Diane Palmer

Nutrition has become a hot topic due to concerns about obesity and health issues. Many people want to know what to eat to help maintain a healthy body.

"As more people turn to the Internet for information, we are posting nutrition fact sheets on Clemson's Home and Garden Information Center website," said Katherine Cason, Extension food safety and nutrition program leader. She is assisted by Janis Hunter, public information specialist.

The fact sheets are posted at <http://hgic.clemson.edu/> under Food Safety, Nutrition, Diet & Health. They provide information on nutrition and dietary guidelines, food shopping and preparation, food technology, health, food safety and preservation. Fact sheets are also available in Spanish.

Nutrition podcasts are being developed in both English and Spanish and are posted at www.clemson.edu/itunesu/ on the Food Science and Human Nutrition channel.

For more information: Katherine Cason, 864-656-0539, kcason@clemson.edu.

Spartanburg Master Gardeners help feed the hungry

By Diane Palmer

As food prices rise, more people go hungry. Many don't know where their next meal is coming from. That's when the Master Gardener Association of the Piedmont and soup kitchens step in to help.

Thirty or more volunteer Master Gardeners have been donating fresh produce from their garden to local soup kitchens for several years. Last year, they donated 2,184 pounds of vegetables to Mobile Meals of Spartanburg, Second Presbyterian Church Soup Kitchen, Miracle Hill, Children's Shelter and Spartanburg Boys Home.

The garden is located on retired Clemson Extension agent Charlie Grey's property in Cowpens. Bonnie Plants nursery donated starter plants. Kline Cash, owner of Cash Farms, allows them to use his refrigerators to store the produce and also donates day-old bread produced at his farm. Harold Page is committee chair for the garden.

This "Plant a Row for the Hungry" program is based on the national model sponsored by the Garden Writers of America. To earn the title of Master Gardener, individuals must complete 40 hours of class work taught by Clemson Extension agents, pass a final exam, and donate 40 hours of service to the community.

For more information: Corey Tanner, 864-232-4431, Ext. 121; shannt@clemson.edu.



Photo by Dick Biggs

ADVENTURE

camp challenges teens

By Chris Copeland

"Teaching kids outdoor adventure skills connects them with nature and gives them incentive to be more active," said Brett Deming, director of the Youth Learning Institute's new Adventure Summer Camp. The 10-day wilderness excursion launched its first season this summer.

Made possible through a partnership with The Cliffs Communities, the camp for kids age 12 to 15 is located at Pinnacle Falls. The 100-acre property features a trout stream, 60-foot waterfall, game field and hiking trails with access to the Foothills Trail and Lake Jocassee.

The excursion involves backpacking, canoeing and mountain biking with a focus on wilderness safety and survival skills. "The adventures really challenged me to see what I could do," said 14-year-old Weston Huggard, from Panama City, Florida.

His parents researched camps all over the U.S. before choosing Adventure Camp. After the closing ceremony, Lisa and Eric Huggard said, "We could tell he had a good time as soon as we saw him."

For more information: Lori Gugan, 864-878-1041, lgugan@clermson.edu; Brett Deming, bdeming@clermson.edu, 864-650-4402; or www.clemson.edu/yli/pages/adventure.php.

Photo by Curtis Clemens



Educators experience first teacher renewal programs

By Pam Bryant

In July public school teachers from across the state gathered to help design a teacher renewal program that is expected to serve thousands of their colleagues over the next decade.

The inaugural seminar of the S.C. Teacher Renewal Center brought 20 teachers to Clemson's Youth Learning Institute in Pickens. They previewed nature-based health and wellness experiences; participated in creative inquiry projects, a nature hike and a forensic science experience; and provided their thoughts for future programs.

"The purpose of the Teacher Renewal Center is to retain the state's best teachers, reward them for their dedication and renew their passion for teaching," said Jack Blodgett, seminar coordinator. "Input from these teachers is essential to develop programs that accomplish these goals."

The Teacher Renewal Center is a partnership among the S.C. Department of Education, The Cliffs Communities, and Clemson University. Forestland between Lakes Keowee and Hartwell was donated by The Cliffs Communities for the center that is planned to include a hotel, restaurant and conference complex.

For more information: Jack Blodgett, 864-650-7018, jblodge@clermson.edu.



Photo courtesy 4H

4-H memorial fund established to recognize outstanding youth

By Diane Palmer

A Clemson University Foundation 4-H memorial fund is being established to honor meat goat producer and 4-H volunteer Jerry Munns of Honea Path.

"She was an outstanding individual and a major force in the meat goat livestock industry," said Danny Howard, Clemson Extension agent in Greenville County.

Munns, an Extension volunteer for more than 15 years, organized the Upstate meat goat producers group and raised thousands of dollars for the 4-H/FFA meat goat project. She also served on the Greenville County Extension Advisory Council.

The scholarship will be used to recognize outstanding youth in the 4-H/FFA Meat Goat Project. To make a donation, make check payable to Clemson University Foundation for the Jerry Munns Memorial Fund. Mail checks to PO Box 1889, Clemson, SC 29633.

For more information: Danny Howard, 864-232-4431, dhoward@clermson.edu, or Daniel Bozard, 864-656-2742, dbozard@clermson.edu.

Volunteers landscape McCormick school grounds

By Diane Palmer

The new elementary and middle school complex in McCormick County has a professional landscape because of a volunteer team led by Clemson Extension agent Wallace Wood.

He organized a landscape committee that included an urban forester from the S.C. Forestry Commission, a local landscaper, a landscape architect and school district maintenance staff. They planted 130 trees and ground cover to reduce erosion and applied lime and fertilizer to grassy areas.

Master Gardeners donated 100 hours to install four Carolina Fence Gardens that incorporate state symbols such as the Carolina wren, Carolina jessamine and blue granite. The volunteers also continue to teach students, teachers and school personnel how to maintain the landscaping.

Because of the volunteers' donation of time and services, the schools have a welcoming appearance. A transportation enhancement grant from the S.C. Department of Transportation helped provide materials for the project.

For more information: Wallace Wood, 864-465-2112, Ext. 11; wwd@clemson.edu.



Photo by Wallace Wood

Strengths-based approach helps students with learning differences

By Pam Bryant

"Our children learn differently, so we teach them differently," proclaims Gillian Barclay-Smith, head of Glenforest School in West Columbia.

The school serves students of average to above-average intelligence who have learning differences such as dyslexia, Asperger's syndrome, ADD and ADHD. To expand academic options for their students, school officials have formed a partnership with Clemson's Youth Learning Institute.

"We acknowledge a student's weaknesses, but more importantly we emphasize their strengths," said Barclay-Smith.

The Youth Learning Institute is recognized for its experiential learning techniques that enhance students' strengths and capabilities. Early goals of the collaboration include adding summer and afterschool programs.

"Glenforest is setting the standard in South Carolina as a model school for students with learning differences," said Jorge Calzadilla, executive

director of the Youth Learning Institute. "We are proud to join the school in celebrating students' unique talents and strengths."

For more information:
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Photo by Youth Learning Institute

Symposium shares best practices for **EMPOWERING** girls

By Chris Copeland

"What works with boys doesn't necessarily work with girls," said Susan Alford, director of The Girls Center at Clemson's Youth Learning Institute, "but professional development programs that address gender-responsive strategies are few and far between in South Carolina."

In response, The Girls Center will host the third annual Empowering Girls Symposium at the Conference Center in Columbia on September 26, in partnership with the Leadership Institute of Columbia College and the S.C. Department of Juvenile Justice (DJJ). The symposium is designed to draw a diverse audience of practitioners, from state human service agencies to faith-based organizations.

Keynote speakers include: Valorie Burton, nationally renowned speaker, life strategist and author of *What's Really Holding You Back?* and other books; Jerry Adger, Deputy Director of SC-DJJ who is nationally recognized for leading a gender-responsive facility for young women; and Carolyn Sawyer, award-winning journalist, entrepreneur and author of *Forget the Glass Slipper*.

For more information or to register: Lori Guban, 864-878-1041, lguban@clemson.edu, or www.clemson.edu/yli/pages/girlssymposium.php.

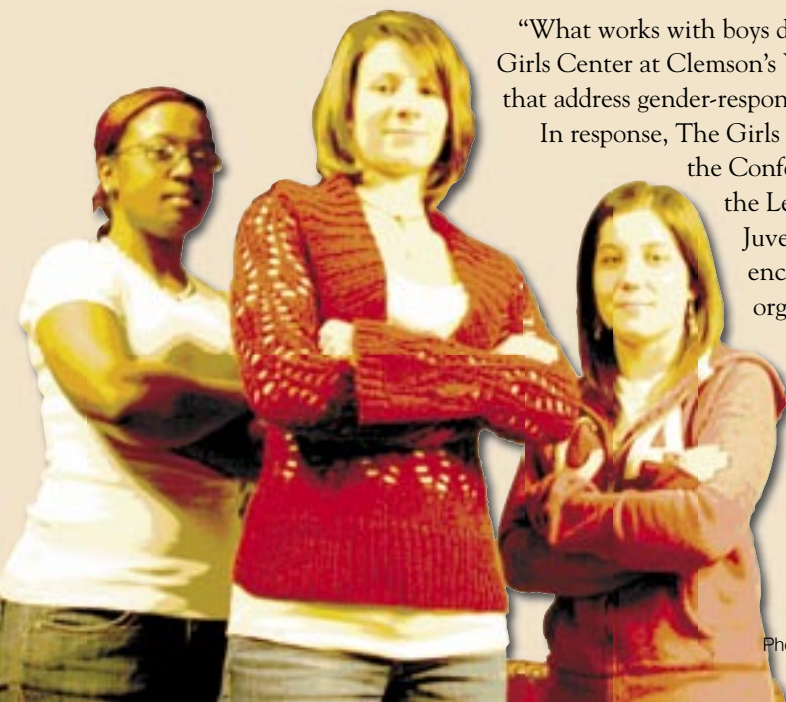


Photo by Youth Learning Institute

Extension focuses efforts into statewide program teams

By Diane Palmer

To better serve commercial producers, communities, consumers and youth, Extension efforts have been focused into seven statewide programs. Program team leaders are below.



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Askew to lead agriculture and natural resources programs

By Peter Kent



George Askew has been named associate dean of agriculture and natural resources to lead statewide Public Service research and extension programs. He has served as interim in the post since 2007.

He joined Clemson in 1980 as assistant professor of forestry at the Baruch Institute of Coastal Ecology and Forest Science in Georgetown. He was named institute director in 1985, executive director of the Wallace F. Pate Foundation for Environmental Research and Education in 1994 and interim director for the Pee Dee Research and Education Center in 2002.

Askew's research focuses on the controlled pollination of loblolly pines, on breeding and selection systems for vegetative propagation, and on the long-term ecology of a coastal forest drainage system. He has received numerous grants from the USDA Forest Service and private agencies for research on forest genetics, seed orchard management, forest recovery from hurricane damage, intensive forest management for energy production, and prescribed fire as a forest management tool.

He holds a B.S. degree in forest management, an M.S. in forestry and a Ph.D. in agronomy, all from Clemson University.

For more information: George Askew, 864-656-2661, gaskew@clermson.edu.

Watermelon field day: Too wet or too dry?

By Peter Hull



Over watering is just as stressful on plants or vegetables as under watering. To understand the correct water usage, it's vital to understand soil types and when the stress levels occur. Go beyond that threshold and a grower likely will lose production.

Extension area vegetable specialist Gilbert Miller is working to understand a fundamental dilemma for growers: the fine line between over watering and allowing the soil to get too dry.

Miller uses in-ground sensors to help determine the causes of hollow heart, a condition that makes melons unmarketable. His research also helps growers control costs and produce higher quality crops by saving fertilizer and water.

"These sensors provide a window into the soil," Miller said. He demonstrated his research in July during the Watermelon and Vegetable Field Day at the Edisto Research and Education Center in Blackville. The free event was attended by more than 150 growers.

For more information: Gilbert Miller, 803-284-3343, ext. 225; gmlr@clermson.edu.

Tree root research helps **fruit growers** develop healthy trees

By Peter Kent

Peach growers are facing a new challenge to production, called Peach Replant Disorder. New trees tend to grow slower and yield less fruit when they are planted on a site that had been planted with peaches earlier.

For the answer to this problem, plant pathologist Christina Wells and her graduate students are focusing on the web of tiny roots that trees depend on for nourishment.

"When are the fine roots of trees produced, how long do they live, and why do they die?" Wells asked. "We are using

root observation tubes and miniaturized cameras to monitor changes in fine root population dynamics in response to irrigation, disease and soil variables."

Her work with colleagues Desmond Layne and Greg Reighard will aid growers to produce healthy orchards and higher fruit yields. The research also may help foresters and landscape horticulturists improve tree growth and longevity.

For more information: Christina Wells, 864-656-6940, cewells@clemson.edu.



Photo by Peter Kent

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